

PHYSIOLOGICAL.

THE EFFECT OF ANÆMIA OF THE NERVE-CENTRES UPON THEIR EXCITABILITY.

V. Aducco has recently made some experiments upon dogs for the purpose of determining what effect partial and temporary anæmia of the nerve-centres has upon their excitability (*Archives Italiennes de Biologie*, tom. xiv., fasc. 1 and 2, 1890; *Lo Sperimentale*, Jan. 31, 1891).

In a first series of experiments Aducco ascertained the normal excitability of the nerve-centre by applying a weak faradic current directly to the nervous tissue. He then produced anæmia by compressing the carotid and from time to time tested the excitability of the centre. After reëstablishing the circulation, the tests were repeated.

In a second series the degree of excitability was determined indirectly, the current being applied to the peripheral nerve or to the skin of the region in which it was desired to produce a reaction.

In some cases the anæmia was brought about by venesection instead of compression of the carotids. The centres in the spinal cord were tested as well as those in the brain.

Aducco, as a result of his experiments, comes to the following conclusions: "When the supply of blood to the nerve-centres is diminished, their excitability is thereby increased. It is probable that this exaggerated excitability persists throughout the whole duration of the anæmia. There would seem to be, within certain limits, an inverse proportion between the *nutrition* and the *excitability* of the nerve elements. The latter increases uniformly as the nutrition diminishes."

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PATHOLOGICAL.

THE NERVOUS TROUBLES OF URÆMIA.

Lancereaux, who has written much and well on the nerve-intoxications, discusses the NERVOUS TROUBLES OF URÆMIA in his recently published "*Leçons de Clinique Médicale*."

The nervous perturbations in uræmia have not the same significance as the digestive. The gastro-intestinal phenomena, in fact, are, at least at their onset, compensatory.

They present a character of utility, even to some extent of necessity, which must be recognized, and which regulates therapeutic interference. The nervous accidents, on the contrary, constitute always symptoms of ill omen, which must be combated as soon as possible. Moreover, the disorders of the first category result from an elective action on the digestive mucosa, the excretory function of which is solicited by the afflux of excrementitious principles. There is nothing like this in the reaction of the nervous system, which is simply encumbered, like all the other tissues, by the products of disassimilation; only it reacts more energetically by reason of its special excitability.

Among the accidents purely nervous, we may first isolate and describe apart the group of *cardio-pulmonary accidents*.

In dyspnœic uræmia the thoracic organs are not directly affected. They only give expression to the functional disorders of the nervous centres.

Dyspnœic uræmia presents three principal varieties: Simple dyspnœa, paroxysmal dyspnœa and spasmodic dyspnœa. Simple dyspnœa is characterized by acceleration and variations of extent of the respiratory movement and by the breathlessness which follows the least effort, even walking. Examination of the mode of respiration always shows a predominance of the diaphragmatic type. This is, moreover, the characteristic of uræmic respiration in general; it is almost exclusively diaphragmatic. The costal type is seen only in uræmic patients who have at the same time material lesions of the lungs or heart. The simple dyspnœa of uræmic patients is sometimes accompanied with laryngeal phenomena, hoarseness of the voice and inspiratory sibilance, which may even simulate serious obstructive disease of the upper air-passages, so as to seem even to call for tracheotomy.

The paroxysmal dyspnœa of the uræmic has been long known as the *Cheyne-Stokes* respiration. It consists in the succession, regular and periodical, of a phase of apnœa or pause, and of a phase of dyspnœa in which the inspirations, at first infrequent, short and superficial, augment gradually in amplitude, become more and more frequent, profound and noisy, then decrease progressively to another pause. The period of apnœa is generally limited to thirty or forty seconds; the complete cycle has a duration of several minutes. The circulation is always more or less embarrassed, the lips are cyanosed; the pupils are contracted during the pause, to become dilated when the respiratory movements are resumed; the psychical faculties are more or

less obtuse. Apart from the probable influence of cardiac steatosis and certain organic cerebral affections in occasionally causing this form of dyspnœa, it is generally renal and uræmic in its origin, and one or two energetic purgatives often suffice to cause it to disappear for a time.

Spasmodic dyspnœa resembles much spasmodic asthma, and hence has been often described as uræmic asthma. It comes on suddenly, like an attack of purely nervous asthma, and generally without any appreciable exciting cause. It consists in the sensation of a distressing anguish, which obliges the patient to sit up in bed, to cling hold of surrounding objects, and to make painful efforts to breathe. The ordinary description of an asthmatic attack is here applicable only during the relaxation phase; expiration is slow, prolonged, but not wheezing; rarely sibilant and sonorous rhonchi are audible to auscultation, and the paroxysm is not followed by expectoration. Vomiting often precedes or follows the attack; the latter may last half an hour or even an hour and be repeated several times during the day and night.

Uræmic dyspnœa is, in general, much benefited by the exhibition of drastic purgatives.

The *circulatory disturbances* observed in uræmia consist in palpitations more or less intense of the heart or even of the blood-vessels. These irregular and intermittent palpitations are felt during rest, and are often aggravated by movement. They are a frequent cause of insomnia. The pulse is ordinarily accelerated during the crises of uræmia, although it may be preternaturally slowed, as before puerperal or scarlatinal convulsions; here we should interpret the phenomenon as due to a perturbation in the innervation of the vagus.

The *cerebral accidents* of uræmia affect the three great functions of sensibility, movement and intelligence, which are singly or simultaneously disturbed.

The sensory disorders consist in subjective sensations of pruritus, of numbness and of pain in different parts of the body; lastly, in temporary visual disturbances.

The pruritus is especially observed in patients whose renal lesions are dependent on generalized arterio-sclerosis, and as this latter alteration is always linked to troubles of the innervation, we may well ask if the itching is not rather the effect of the general morbid state which engenders the renal affection than of this affection itself. These itching sensations have for their more special seat the genital organs.

Other morbid sensations are those formications and pricklings of the limbs which are observed especially in arterial nephritis, and which may be due to an imperfect sanguineous irrigation. The only *articular* pains which it is possible to ascribe to uræmia are those erratic, flitting pains of the Brightic, and which yield to purging; these evidently originate in the nervous system, and not in any material disorder of the joint. To the same category belong those painful cramps of which some patients complain, and which are seated preferably in the muscles of the leg.

As for the *digitus semi-mortuus* phenomenon (the dead-finger sensation), which is by some writers ascribed to uræmia, it is a symptom common to the neuropathic and atheromatous.

Cephalalgia is an ordinary symptom of uræmic poisoning, and appears in the form of a simple headache, or of pains which bear a great resemblance to migraine. The first of these forms is continuous, with paroxysms which may come on in the daytime, but oftener supervene in the night. Moreover, nocturnal exacerbations are almost pathognomonic. The pain has for its seat sometimes the frontal region, sometimes the occipital, and reveals itself by a sensation of horrible discomfort, of weight, of pressure, rather than of painful lancinations. It is rarely located in the temporal region; oftener it occupies the entire head, and is compared to a hoop encircling and compressing the cranium, or a tight and heavy helmet.

The intensity of the headache (causing outcries), joined to the nocturnal paroxysms, reminds one of the osteocopic pains of syphilis. If in doubt, the result of treatment will sometimes clear up the difficulty; the antisyphilitic treatment (iodide of potassium, minute doses of calomel) will be found inefficacious, while a few purgative doses of Carlsbad salts will give speedy and magical relief.

The *migrainous* form is intermittent, and supervenes by crisis of a duration which varies from several hours to several days. Sometimes unilateral, it is oftener frontal. The pains are of a rending, grinding, crushing, compressing character; arterial beatings (aggravating the pains) and lancinations (so common to migraine) are rarely complained of. The pain is exceptionally accompanied with nausea and vomitings.

Vertigo is a symptom which is quite often observed in uræmia; it is not always, however, due to uræmic poisoning, being frequently dependent on a morbid state of the cerebral arteries.

Amaurosis sometimes accompanies the uræmic crisis, appearing suddenly at the onset, continuing through the attack, and disappearing with it. The vision is obscured or even almost abolished; objects appear as through a mist. It is the result of a simple functional disturbance. Diplopia, hemiopia and even hemeralopia have also been noticed.

Cophosis is also an occasional symptom of uræmic poisoning.

The *motor disorders* of uræmia are less complex than the sensory. They manifest themselves under the form of contractures, convulsions, and even of paralyses.

Contracture is relatively rare. In the majority of cases, when present, it is fugacious and associated with a transient paralysis or with eclamptic paroxysms. When isolated, it is generally localized in the muscles of the back of the neck, causing a stiffness and a slight bending backward of the head; this is frequently strongly suggestive of meningitis.

Convulsions represent the most common type of the motor disorders of uræmia. They are partial or general. Partial convulsions consist in muscular twitchings, sub-sultus tendinum and convulsive shocks resembling electric shocks. General convulsions strikingly resemble the epileptic seizure; they are known under the name of uræmic eclampsia, of which puerperal convulsions are the type. Uræmic eclampsia with general convulsions is exceptionally met with in interstitial nephritis linked to general atheromasia, while at the same time persons suffering from this form of nephritis form the majority of the uræmic.

Uræmic paralyses affect generally a great number of muscles, and are confined to one-half of the body (uræmic hemiplegia). They ordinarily appear in the course of nephritis dependent on arterio-sclerosis. This kind of paralysis succeeds a pseudo-apoplectic attack. The case is supposed to be one of cerebral hemorrhage; but if the patient dies, the autopsy discloses only atheroma of the vessels of the encephalon. When the patient survives the attack, he is found to be hemiplegic; but to the surprise of his medical attendant this "wears off" after a few days: the patient regains perfectly the use of his members. Later on there comes another attack on the same side or on the opposite side. Such pseudo-apoplectic attacks are not rare in aged persons affected with arterial nephritis. Raymond, Chantermesse and Tenneson, besides Lancereaux, have reported cases of the kind.

Aphasia is rarely witnessed in uræmic poisoning; when supervening, it appears at irregular or periodical intervals, and is transitory.

Uræmic coma is relatively common. It is generally associated with other uræmic manifestations; it succeeds convulsions and frequently accompanies paralyses; but in some cases it remains isolated, constituting the sole disorder. There are all grades in the depth of the somnolence; sometimes the patient lies in a state of semi-consciousness for entire days, replying in monosyllables when spoken to in an earnest tone of voice. Seated in his arm-chair or lying in bed, generally a prey to a painful dyspnœa, the patient utters complaints or groans when he awakes, and speedily relapses into his hebetude.

At other times the coma comes on suddenly, and is much more pronounced. The patient is struck down with an apoplexy, and becomes insensible to all excitations; his face is pale, the pupils are immovable, the pulse is slowed, the respiration irregular, sibilant or stertorous, sometimes puffing. Muscular resolution is then general, the limbs when raised fall back flaccid, as if they were paralyzed. Death may take place during a first attack. Œdema of the cerebrum is sometimes met at the autopsy, but it may be lacking; or the patient may come out of his coma, manifest some hebetude and obtusion of the intellectual faculties, but respond to questions and take nourishment; then, after a few hours, a day or two, or even several weeks, he again lapses into the same apoplectic inertia, and may have several such attacks before he dies.

The diagnosis is always difficult in cases of this kind. The absence of reflexes speaks in favor of uræmia. The examination of the urine and the state of the temperature have a great semeiological importance and a real value from the point of view of prognostic and therapeutic indications.

Uræmic madness or delirium is a rare symptomatic manifestation of renal insufficiency. When it makes its appearance it is generally in the course of interstitial nephritis, especially of that form which is dependent on arteriosclerosis. Uræmic delirium has, however, been witnessed in scarlatinous nephritis, and it is probable that many observations of puerperal mania belong to this category.

When uræmic delirium is associated with other troubles, nervous or digestive, it is habitually mild, calm and transient, rather than noisy and persistent; hence it may pass unperceived, and generally it has but a secondary importance.

If, on the contrary, this accident is the predominant phenomenon and sums up in itself all the uræmic disorders, it is more pronounced, and presents particular characters which it is absolutely necessary to know well. In fact, it is not enough that there should be delirium and a renal lesion to constitute *uræmic insanity*; this delirium should have a special behavior which distinguishes it from other forms of delirium.

Rarely it bursts forth all at once; almost always it is preceded by insomnia, change of disposition, by melancholy or by impatience, by headache or dyspnœa, or other signs of urinary insufficiency. It is active, boisterous, rather than depressive; hence its type resembles acute mania.

Hallucinations, when they exist, affect sight or hearing, and are rather terrifying than gay. The patients believe that plots are formed to injure them, to poison them, and in certain cases they refuse all food.

Uræmic delirium has remissions and paroxysms, rarely a uniform and continuous progress. It may last for months; but its duration is ordinarily shorter—a few weeks or only a few days—and, like the convulsions and coma of uræmia, it generally kills the patient unless it is met by the appropriate treatment. Patients affected with it have frequently been sent to asylums and put under restraint. This is bad practice, and may be followed by fatal results.

Uræmic delirium presents serious diagnostic difficulties, arising from the morbid predispositions which in an albuminuric patient, as in any other person, may be awakened by various exciting causes. It is conceivable that an alcoholic patient affected with renal lesion may be taken with a delirium absolutely foreign to this lesion. It is the same with an individual who has antecedents of insanity in his family; hence it is important to have clearly in mind the characters of uræmic insanity if one would arrive at a correct diagnosis. These characters may be summed up as follows: Appearance of the delirium generally after well-known uræmic phenomena; maniacal exaltation with general incoherence, which may disappear at the end of several days or end in a dementia of short duration, in coma, or, lastly, in death. We have here, then, a grave disorder, which we should know how to diagnosticate in order to treat it properly and to avoid the disaster of committing to an asylum the unfortunate victims of this form of mental alienation.

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